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TEN YEARS OF SUCCESSFUL BALD EAGLE NESTING IN KANSAS

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INTRODUCTION

From 1989 to 1998, there were eight documented Bald Eagle (*Haliaeetus leucocephalus*) nesting territories in Kansas, which successfully fledged 75 juvenile eagles. The first historically documented nest site to successfully fledge young occurred in 1989 at Clinton Lake, Douglas County (Schwilling, et. al., 1989). Although historical records indicate the species probably nested in Kansas before 1900, there is no confirmed documentation. The most productive year on record was 1997 when 16 eaglets were fledged from seven nesting territories (Watkins, et. al., 1998). In 1998, 11 eaglets were fledged from five nesting territories (Table 1). Each year the U.S. Fish and Wildlife Service (FWS) attempted to band eaglets and/or adults from selected territories. Thirty-four eagles have been banded with standard FWS aluminum leg bands and purple visual identification leg bands with silver letters or alphanumeric characters. The subsequent nesting history of the original eagles fledged in Kansas provided important insight into bald eagle behavior, nest site tenacity, and population growth in newly exploited habitats (Watkins, et. al., 1994).

NEST LOCATION	NUMBER OF EAGLETS FLEDGED										
	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	TOTAL
Clinton Lake	2	3	3	3	3	3	2	3	3	3	28
Hodgeman County	--	1	2	2	2	3	--	--	--	--	10
Hillsdale Lake	--	--	--	--	1	2	2	2	2	2	11
Flint Hills NWR	--	--	--	--	0	--	--	--	--	--	0
Perry Lake	--	--	--	--	--	2	0	2	3	2	9
Wolf Creek Lake	--	--	--	--	--	2	1	2	3	2	10
Stafford County	--	--	--	--	--	0	0	0	2	0	2
Jefferson County	--	--	--	--	--	--	--	--	1	0	1
Sebelius Reservoir	--	--	--	--	--	--	--	--	2	2	4
TOTAL	2	4	5	5	6	12	5	9	16	11	75

Table 1 – Bald Eagle Nesting Data, 1989 to 1998.

METHODS

Periodic observations of known nesting territories began in January of each year. When eagle activity increased around a nest site, monitoring efforts also intensified. As critical nesting events approached, weekly visits increased to daily observations,

where possible. Beginning incubation dates were established by observing eagles setting low on the nest, switching of incubation duties and/or rolling eggs. Hatch dates were determined by adult brooding postures, observations of adults feeding young, and/or observed chick defecations. Fledging dates were established when juveniles were observed flying or perched in adjacent trees. All dates are assumed to be plus or minus two days.

RESULTS

NESTING TERRITORIES – Five successful nesting pairs established territories at man-made lakes. Four of the five eagle pairs constructed nests in snag trees that were flooded when the lakes were impounded. The nests were located from 5 to 17 m above the normal lake water elevation. The other pair of eagles constructed two productive nests, both located in live trees adjacent to the shoreline. The nests were located from 9 to 15 m above the ground.

Two nesting territories were established in riparian corridors along major rivers and one (Hodgeman County) was established in a small strip of riparian woodland adjacent to an intermittent creek and cropland. The three nests were constructed in live trees and were 10 to 20 m high.

All nesting territories were adjacent to or included large bodies of water (375 to 4,500 ha) or a perennial river except the Hodgeman County site. Only a small spring fed pond was found within 52 m of the Hodgeman nest tree. It was approximately 0.6 ha in size and was a reliable source of water even during severe droughts (ibid). Nevertheless, the water source was too small to provide a complete food supply. The surrounding area is primarily cropland and rangeland and appears more typical of Golden Eagle (*Aquila chrysaetos*) habitat. An investigation in and around the nest revealed the remains of a variety of prey, including Common Carp (*Cyprinus carpio*), bullhead (*Ictalurus sp.*), unidentified catfish, Green-winged Teal (*Anas crecca*), American Coot (*Fulica americana*), Great Blue Heron (*Ardea herodias*), Ring-necked Pheasant (*Phasianus colchicus*), Red-tailed Hawk (*Buteo jamaicensis*), Black-tailed Prairie Dog (*Cynomys ludovicianus*), Yellow-faced Pocket Gopher (*Pappogeomys castanops*), Black-tailed Jackrabbit (*Lepus californicus*), and Eastern Cottontail (*Sylvilagus floridanus*) (ibid).

NESTING BEHAVIOR – Six of the Bald Eagle pairs returned to the same nest each year. The birds refurbished existing nests and either fledged additional offspring or had their nesting attempts terminated by inclement weather. The Clinton Lake nest was productive for the longest period of time, ten years. The nest was destroyed by a storm in the fall of 1998 after the young had fledged. It appeared that the undercarriage of the nest rotted away, yet the nest tree and support branches appeared to be intact. It is likely the pair will return and construct a new nest in the same territory. The Hillsdale Lake nest, Miami County, has been successful for 6 consecutive years. This is the second longest nesting period in the state in which the same nest was used.

Two pairs have constructed and used additional nests in the same nesting territory even though the original nest appeared structurally sound. The Perry Lake eagles, Jefferson County, abandoned their original nest after successfully fledging young the first year. A second nest was destroyed by inclement weather in the spring of 1995. During the last three years, they have successfully fledged young from a nest constructed in the summer and fall of 1995. The Wolf Creek eagles, Coffee County, also abandoned their original nest after their first successful season in 1994. They fledged young from a second nest for three years before constructing a third in 1998 where they fledged two offspring. A pair of great horned owls has used the original nest since 1996.

There have been 41 Bald Eagle nesting attempts in nine nesting territories in Kansas since 1989, of which 34 were successful. An unsuccessful nesting attempt is one where continuous incubation behavior was observed (18 days plus), but no young were fledged. Four nesting attempts failed due to inclement weather, one contained infertile eggs (Flint Hills National Wildlife Refuge, eggs abandoned in nest after 40 plus days of incubation) and two were abandoned for unknown reasons. Accurate nesting data has been collected on 74% of the successful nesting

efforts. The earliest date incubation behavior was observed was January 29 at Clinton Lake. The latest that a successful pair began exhibiting incubation behavior was March 27 at Wolf Creek. Four percent of the documented, successful nesting attempts began in January, 56% in February and 40 % in March. The average incubation period was 39 days and the average age at fledging was 77 days.

NESTING SUCCESS - The 34 successful nesting attempts in the state produced 75 fledgling eaglets. The average number of young fledged per successful nesting attempt is 2.2 or 1.8 if all 41 attempts are included. Both these figures exceed the national average of 1.6 (Stalmaster 1987). The Clinton Lake nesting territory is the most productive in the state and one of the most productive in the country. During the 1960's and 1970's, only 2% of the nearly 4,000 North American Bald Eagle nests produced three young (ibid). The adults at Clinton Lake fledged three young in eight of their ten nesting seasons and two young each, the other two years. A total of 28 eagles have fledged from the Clinton Lake nest over the last ten years (2.8 annually).

The U.S. Fish and Wildlife Service banded 32 of the 75 eaglets fledged in the state. Twenty-one juveniles have been banded at Clinton Lake, ten at Wolf Creek and one at Hodgeman County. Of those banded, 20 were males, nine were females and the sex of three was not determined. Two techniques were used to make gender determinations. Bill depth and hallux (rear talon) length were key components in Stalmaster's (1987) equation; $(\text{Bill Depth} \times 0.392) + (\text{Hallux Length} \times 0.340) - 27.694$. If the resulting value is positive, the eagle is a female; if negative it is a male (ibid). In addition, overall juvenile size and weight were used to help make final gender determinations.

The fate of four banded eaglets is known. Eagle A, originally banded as a fledgling at Clinton Lake in 1989, established the Perry Lake nesting territory in 1994 (Watkins, et. al., 1994). Eagle B, a nestling of Eagle A, established the nesting territory at Hillsdale Lake in 1993 (ibid). On July 27, 1995, the remains of Eagle 2E were discovered among the high water drift debris south of the nest tree at Clinton Lake (Watkins et. al., 1996). This bird had been banded at the Clinton Lake nest site in April of the same year. The remains of eagle 2S were recovered in Cass County, Missouri in September 1997. Eagle 2S had fledged from the Clinton Lake nest site on June 10 of the same year. The cause of death of both eagles could not be determined. In addition to banding 32 juveniles, the adult male at Clinton Lake was banded in 1991. He has returned to the nest every year since the visual identification band E was attached. The female at the Stafford County nest site was banded in 1997. She has not been positively re-observed since that time.

ORIGIN OF NESTING ADULTS - Thirty-eight percent of all nesting adults and 50 percent of those adequately observed, have identifying markers. The two nesting adults with purple visual identification bands A and B were banded at Clinton Lake in 1989. Two eagles were released as part of Bald Eagle re-introduction programs outside of Kansas. The Hillsdale female, E-27, came from Oklahoma and the Jefferson County eagle with the orange and blue patagial wing tags came from Missouri. The two Wolf Creek eagles only have standard FWS aluminum leg bands and their origins have not been determined (Watkins et. al., 1994). Nevertheless a relatively high percentage of nesting adults in Kansas have identifying markers.

DISCUSSION

Habitats created by large man-made lakes have played an important role in establishing nesting Bald Eagles in Kansas. Four of the first five eagle nesting territories were established at lakes and 83 percent of the eagles fledged in the state have come from nesting sites at large water impoundments. There are numerous nesting territories at other unoccupied lakes across the state. New nesting pairs continue to take advantage of this habitat type. The utilization of habitats created by large man-made water impoundments has created unique conflicts between nesting eagles and other authorized lake purposes, particularly recreation. The creation of buffer zones around nests that restrict human access, have proven to be effective in reducing potential conflicts with recreational users.

Riparian corridors along major rivers may also play a role in providing habitat for

new nesting pairs. Nests found in this habitat type in Kansas are more typical of traditional Bald Eagle nest site placement. Nests are usually constructed below the top of the crown in a live tree, where young are sheltered from the elements and the parents have adequate aerial access (Palmer 1988). Riparian habitats along a perennial river were first successfully used in Kansas in 1997. However, mature riparian corridors with dominant live trees could become more significant as additional nesting pairs move into the state and snag trees in the lake habitat type begin to decay.

Seventy-five percent of the nesting eagles in Kansas have used or attempted to use the same nest for their entire breeding history. This is contrary to the majority of nesting eagles across the country. In most, but not all instances, Bald Eagles will have more than one nest in their breeding territory (Stalmaster 1987). Several theories have been developed to explain the use of multiple nests: 1) Bald Eagles are programmed to build or refurbish their nests as part of a sequence of breeding events; 2) alternate nests may serve as insurance if the occupied nest is destroyed or rendered undesirable for some reason; 3) changing nests may be a way of marking breeding territories to warn other potential nesting pairs to stay away (ibid). The majority of nesting eagles in the state refurbished their old nest at the beginning of each breeding season.

In Alaska, the average life expectancy of a nest tree is about twenty years (Gordon 1991). Most nest trees collapse under the weight of the Bald Eagle's nest, usually during strong winds (ibid). Six of the Kansas nests were constructed in dead, decaying trees that were flooded when the lakes were originally impounded. At Hillsdale Lake, even though a significant support branch was lost during a storm in 1997, the eagles refurbished the nest and fledged young from the same tree. The nest has been productive for six consecutive seasons. In 1998, the Clinton nest tree was determined to be structurally sound even after ten nesting seasons. The nest itself was blown out of the tree by a storm during the fall after the young fledged.

Sixty-nine percent of the juvenile eagles whose sex could be determined were males. This male to female ratio is conducive for expanding the nesting eagle population in Kansas. Data from seventeen hatched eagles in New York showed that males established nests an average of 58 km from their release sites, while females nested an average of 161 km from where they fledged (Nye 1990). This tendency is supported by the return and establishment of nesting territories by Eagle A and B, both of which are males. Eagle A's nesting territory at Perry Lake is located 24 km from where it was fledged and Eagle B's territory at Hillsdale Lake is located 45 km from the territory where it was raised.

As a result of increased Bald Eagle numbers nation wide, the FWS reclassified the Bald Eagle from endangered to threatened on July 12, 1995. It is proposed to be removed from the endangered species list by the year 2000. The number of Bald Eagle nests in Kansas may increase in the future due to increased numbers nationwide, the number of potential nesting territories, the relatively large proportion of male eagles that have been fledged, and the significant number of practice nests that have been observed over the past several years.

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A HALF CENTURY OF CHANGE IN A KANSAN AVIAN COMMUNITY

By
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INTRODUCTION

The University of Kansas Natural History Reservation (renamed in 1988 as the Fitch Natural History Reservation) is a 590-acre tract occupying most of the northeasternmost section of land in Douglas County, northeastern Kansas. It was created in 1947 from land already long owned by the University, with the intent to preserve it as a natural area with a sample of the native Kansan biota free from anthropogenic stresses (Fitch, 1965).

I began field work on 1 July 1948 as the newly appointed superintendent of the Fitch Reservation. At that time the area presented a mosaic of contrasting habitats; about half was woodland with a mixture of climax and seral tree species, mainly on the slopes between hilltops and the two small valleys. Both the flat hilltops and the valleys were almost evenly divided between cultivated fields and pastureland, where horses and cattle had been kept by neighboring farmers, with overgrazing moderate to severe.

At the outset adjoining land on neighboring farms was similar, with a mixture of cultivated fields, pasture and woodland. Subsequently over two decades a series of land purchases expanded the University's holdings but only the Fitch Reservation was maintained as a natural area. Purchases included: in 1956 the quartersection Rockefeller Tract in Jefferson County adjoining the Fitch Reservation on the north; in 1970 the John H. Nelson Experimental Study Area (NESA) of 440 acres, also in the southeasternmost section of Jefferson County, and finally the Yelton Tract, a smaller acreage in Leavenworth County adjoining the John H. Nelson Experimental Area on the east. The Fitch Reservation, John H. Nelson Experimental Area, Rockefeller Experimental Tract and Yelton Tract, all within .5 miles of the point where Douglas, Jefferson and Leavenworth counties meet, are referred to collectively as the tricounty area. (Kettle, 1991).

During the past half century, but especially in the Fitch Reservation's early years I made observations on birds and kept written records of ornithological interest, but deteriorating hearing, vision and endurance have seriously curtailed such activities in the 1990s. Many other persons, including Kansas University students and professors, have visited the area regularly or occasionally and have contributed significant records.

RESULTS

A wide range of field studies has been made on the Kansas Ecological Reserves (KER) over the past three decades. Pittman (1991) published Birds of the Kansas Ecological Reserves listing 215 species with their seasonal status and abundance. Of the 215 species 13 were found only in Baldwin Woods (a unit of KER located 15 miles south of the tricounty area), whereas 202 were found in the tricounty area, either on the Fitch Reservation or very near its boundary, but only 82 of these were known to breed locally. Of the 202 tricounty species 143 were of irregular occurrence and were classified either as occasional (51 species) "irregular .. in annual frequency, present in low densities", uncommon (32 species) "present in low densities" or rare (19 species) "few records, erratic in occurrence", or in some combination of these categories (41 species) changing according to season.

A study of Pittman's list indicates that many of the species changed their status between 1948 and 1991. Experiments and management procedures on the combined NESAs, Rockefeller Tract and Yelton Tract, with mowing, grazing and burning of selected portions have tended to prevent or delay the course of succession and have resulted in a high degree of habitat diversity. Parts of the area preserve habitats like those that were still present on the Fitch Reservation in 1948.

During 50 years of field work ecological succession has been a major source of change with a trend from shortgrass of heavily grazed pastures to a tallgrass/weed mixture and eventually to woodland of various types. Changes on a continental scale pesticide contamination, habitat loss and overhunting likewise have affected many local species. Also, direct interactions with humans on a local or broader scale has benefited some kinds of birds and affected others deleteriously. Although the changes wrought by ecological succession on the natural area of the Fitch Reservation and the anthropogenic changes that have occurred on a continental scale undoubtedly have affected every avian species, some were much less affected than others and seemed to maintain their populations with no striking changes over long periods. Common species of this category include: Turkey Vulture (*Cathartes aura*), Mourning Dove (*Zenaidura macroura*), Yellow-billed Cuckoo (*Coccyzus americana*), Barred Owl (*Strix varia*), Red-bellied Woodpecker (*Melanerpes carolinus*), Downy Woodpecker (*Picoides pubescens*), Northern Flicker (*Colaptes auratus*), Eastern Wood-pewee (*Contopus virens*), Great Crested Flycatcher (*Myiarchus crinitus*), Blue Jay (*Cyanocitta cristata*), Black-capped Chickadee (*Parus atricapillus*), Tufted Titmouse (*Baeolophus atricapillus*), American Crow (*Corvus brachyrhynchos*), Red-eyed Vireo (*Vireo olivaceus*), Mourning Warbler (*Oporornis formosus*), Eastern Towhee (*Pipilo erythrophthalmus*), and Baltimore Oriole (*Icterus galbula*). Another group, of species are those that have been present continually but have undergone significant reduction in numbers. They include Red-tailed Hawk (*Buteo jamaicensis*), Great Horned Owl (*Bubo virginianus*), Common Nighthawk (*Chordeiles minor*), Whip-poor-will (*Caprimulgus vociferus*), Wood Thrush (*Hylocichla mustelina*), Bell's Vireo (*Vireo bellii*), Blue-gray Gnatcatcher (*Poliophtila caerulea*), Field Sparrow (*Spizella pusilla*), Northern Cardinal (*Cardinalis cardinalis*), Rose-breasted Grosbeak (*Pheucticus ludovicianus*), and (*Carduelis tristis*). Some species experienced one or more reversals of population trends as habitat changes benefited or harmed them (Fitch, 1958).

Northern Bobwhite (*Colinus virginianus*). Increased in the 1950s as the formerly overgrazed pastures developed a luxuriant grassweed mixture, but declined in later decades as stands of trees shaded out low herbaceous vegetation.

Chimney Swift (*Chaetura pelagica*). Seen more often after the residence was completed on the area early in 1950; the building's chimney was a center of attraction and many generations of swifts nested there, but in later decades the transition from open fields to woodland apparently created conditions less favorable and the swifts were no longer seen regularly.

Ruby-throated Hummingbird (*Archilochus colubris*). Rarely seen in the first year of field work, as neither the woodland nor the overgrazed pastures were attractive, but as the grassweed mixture developed after removal of livestock, patches of Canada germander (*Teucrium canadense*) provided an abundant nectar supply and hummingbirds were seen frequently. Later the spread of woodland and the reduction of forbs were accompanied by a decrease of hummingbirds, and by the

1990s the species had become a rarity.

Carolina Wren (*Thryothorus ludovicianus*). This species in most years were present in the headquarters area, but there were drastic reductions as a result of severe winter storms, and they were absent from midFebruary to late June 1952, from midMay until late December 1954, for many weeks in late winter and again in early summer 1955, from the end of 1959 to late August 1960 and for most of 1961 and early 1962.

Eastern Bluebird (*Sialia sialis*). The heavily grazed pastures with scattered trees for perches provided excellent bluebird habitat in the Fitch Reservation's early years but the change to tallgrass with reduction of forbs rendered the area much less favorable. In the 1960s and subsequent decades the practice of mowing an area of more than one ha at frequent intervals, in the residence area, created conditions favorable for bluebirds, and a pair often established their territory and nested there.

Eastern Meadowlark (*Sturnella magna*). The early change from overgrazed pastures to areas with lush tallgrassweed mixture permitted meadowlarks to colonize various parts of the Fitch Reservation, but by the 1980s all had been eliminated as trees came to dominate these formerly open areas.

House sparrows (*Passer domesticus*). All farmsteads in the tricounty area have House Sparrows which avoid more natural situations. In the early 1950s, with much effort directed to study of small mammals, the grain used as bait attracted house sparrows and occasionally they nested there but did not establish a permanent colony. Those present seemed to maintain contact with colonies on neighboring farms as much as a mile away; they were often seen to leave in high, direct flight, headed for one of these neighboring colonies.

Eastern Phoebe (*Sayornis phoebe*). Before there were buildings on the Fitch Reservation phoebes nested beneath a county road bridge at the western edge of the area. After 1949 they nested regularly in the headquarters area and several favorite sites under the eaves of the residence or garage were utilized many times over the years.

At least 11 species that were formerly common on the area have disappeared or are seen only as occasional wanderers.

Cooper's Hawk (*Accipiter cooperi*) For a period of years through the early 1950s Cooper's hawks regularly nested on the wooded hillside south of the Fitch Reservation headquarters and were present year round. In recent years these hawks have been seen only a few times as occasional vagrants.

Broad-winged Hawk (*Buteo platypterus*) in the early years it nested regularly on the area and usually there were two or more pairs centering their activity on the old quarry site at a hilltop north of the headquarters. There have been only a few sight records of vagrants in recent years.

Kestrel (*Falco sparverius*). In early years at least one territory overlapped pastureland of the Fitch Reservation on its south edge but by 1960 habitat had deteriorated with invasion of dense brush and trees and Kestrels were no longer seen.

Long-eared Owl (*Otus asio*). In early years these owls were often heard calling at the pond and probably were permanent residents but none has been seen or heard in recent decades.

Whip-poor-will (*Caprimulgus carolinensis*). These goatsuckers were seen and heard frequently in some years of the early 1950s but there are no recent records.

Western Kingbird (*Tyrannus tyrannus*). Kingbirds were seen and heard often in open areas and especially at the pond in early years but not in recent decades.

Horned Lark (*Eremophila alpestris*). Larks were present in barren and eroded fields in the northeastern part of the Fitch Reservation in 1948 and 1949 but disappeared soon thereafter when a stand of tallgrass was reestablished.

Yellow-breasted Chat. (*Icteria virens*). These chats were present in streamside thickets in early years but disappeared in the 1960s when their former habitat was dominated by trees.

Dickcissel (*Spiza americana*). They inhabited several types of grassland on the Fitch Reservation in the 1950s but were eliminated as trees invaded these habitats.

Lark Sparrow (*Chondestes grammacus*). This sparrow disappeared from the edges

of formerly grazed areas after 1949 when a rank growth of tallgrass and weeds prevented ground foraging and after 1953 from a barren upland field formerly cultivated.

Vesper Sparrow (*Pooecetes gramineus*). Like the lark sparrow this sparrow disappeared as open spaces became covered with dense ground vegetation. Only two species that were not present originally became established on the Fitch Reservation during the course of my field work:

Wild Turkey (*Meleagris gallopavo*). By the early 1980s turkeys, reintroduced to the general area by the Kansas Department of Wildlife and Parks at an unknown time and place, were seen and/or heard occasionally. Their occurrence has continued to be erratic; sometimes weeks or months pass with no sightings. Flocks seem to wander widely. However, in most years successful reproduction is indicated by the flushing of hens from nests with eggs, or seeing broods of partly grown young. There seems to have been a gradual increase.

White-breasted Nuthatch (*Sitta carolinensis*). Inexplicably absent at the outset, this nuthatch was first seen on the Fitch Reservation on 24 November 1955. The lone bird seen then was observed frequently in the ensuing months, was colorbanded, and its territory was mapped as 37 acres. In later years other individuals gradually augmented the local population, and by the 1990s the species had become one of the common residents.

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